Fuzzy logic controller design for a small scale industrial hot air blower heating and ventilation system.

ABSTRACT

In this paper, a single-input fuzzy logic controller (SIFLC) is designed and applied on a nonlinear heating and ventilation plant VVS-400 developed from Instrutek, Larvik, Norway. VVS-400 is modeled using Auto-regressive with exogenous input (ARX) model structure and linear black-box technique. The proposed SIFLC offers significamt reduction in rule inferences and simplify the tuning of control parameters. Instead of using two input (e, e) in the conventional FLC, this method simplifies the number of input by deriving new solitary input variable known as signed distance, d To verify its effectiveness, this control method is stimulated and performs an online using System Identification approach shile the real plant model is developed by interfacing the Real-time Windows Target toolbox in Matlab with real VVS-plant using data acquisition (DAQ) card PCI-1711. The SILFC provides several advantages over convertional FLC due to its simple inference rule mechanism, require very minimum tuning effort and minimizing the computational time to accomplish the controller algorithm. However, simulations and experiments validate the equivalency of both controllers. Results reveal that SIFLC and conventional FLC have almost similar output performance but SILFC found to be better than FLC due to its less computational time compared to conventional FLC.

Keyword: Fuzzy logic controller; VVS-400; Signed distance method; Single-input fuzzy logic controller.